COPPERHEAD INDUSTRIES, LLC

SnakeBite

CORROSION PROOF WIRE CONNECTORS

Designed for use with tracer lines, the DryConn® Direct Bury Lug eliminates the need to cut the main line and installs in less than a minute. Instructions: 1. Strip main and tap conductor 2. Place stripped conductor into slotted lug 3. Torque to 35lb-In 4. Repeat on lateral run 5. Remove sealant cover and discard. 6. Close housing, aligning conductors until housing lid is fully latched

PRODUCT SPECIFICATIONS & MEASUREMENTS

Waterproof and Corrosion Proof
Max. Voltage: 50V
Connector Size: 1.138" x 1.285"
Wire Range: #14-10 solid and stranded copper; #12 steel core tracer wire (380 and 1200 pound)
Silicone Sealant Temperature Rating
Part # 3WB-01 (Blue)
Package quantity - 10

Part # SCB-01-SR (Blue) Box quantity 100

Part # SCB-01 (Blue) Box quantity 100
***Part# SCB-01-LG (wire range #14-#6)**
Package quantity - 8

1. Strip wires ½" 2. Align conductors 3. No pre-twisting needed. Hold stripped wires together with even ends 4. Push wires firmly into connector when starting 5. Twist connector onto wires pushing firmly until tight

PRODUCT SPECIFICATIONS & MEASUREMENTS:

Waterproof and Corrosion Proof
Max. Voltage: 600V (1,000V in fixtures and signs)
Connector Size: 13/16" x 2"
Wire Type: solid and stranded copper; copper clad steel wire
Wire Range: Min #22 / Max #8
Temperature Rating: 75°C (167°F)
Silicone Sealant: -45°F to 400°F
Max 4- #12 wires

Copperhead Industries, LLC ~ P.O. Box 1081~ Monticello, MN 55362 Ph (877)-726-5644 Fax (763)-271-3694

SDR 26 D-3034/PS115 F-679 "HWS" FITTING SPECIFICATIONS

1.0 **GPK PVC Heavy Wall Sewer Fittings** shall be manufactured in accordance with ASTM Standards D-3034 and F-1336 and F-679. Heavy Wall Sewer Fittings (HWS) are produced in sizes 4" through 36" diameter.

2.0 **The Purpose of GPK Heavy Wall Sewer Fittings** is to convey municipal sanitary and industrial wastes, storm water run-off and many other related applications. They are designed to be used in gravity flow and low pressure applications not to exceed 10.8 psi. Heavy Wall Sewer Fittings are typically used when a higher degree of strength is desired to give an added assurance of product reliability.

3.0 **Injection Molded Fittings** are produced in sizes 4" through 8" diameter. **Fabricated Fittings** are produced in sizes 4" through 36" diameter. A fabricated fitting is considered any fitting made from pipe or a combination of pipe and molded components.

4.0 **Chemical Resistance.** GPK fittings resist attack from certain alcohols, alkalies, salt solutions, acids and other types of chemicals. Refer to chemical resistance chart for suitability.

5.0 **Marking.** GPK fittings shall be marked with company name or logo, applicable size, "PVC", "PSM", the Heavy Wall Sewer designation "HWS" and the ASTM specification number (D-3034/F-1336/F-679). The fittings and/or packaging shall also include the manufacturer's date and shift code.

6.0 **Testing.** A test after installation of either low pressure air (Uni-B-6) or a water infiltration-exfiltration test is recommended.

7.0 **Backfilling and Tamping.** Backfilling should follow closely after assembly of pipe and fittings.

7.1 **Backfilling** with proper material is important to achieve desired density in haunching area which enables pipe, fittings and soil to work together to meet designed load requirements. This eliminates excess deflection and shear breaks due to heavy loads. Approved material shall be used properly, compacted continuously above and around the pipe and fittings as well as between the fitting and trench wall. A cushion of approved material up to a minimum of 12" over the fittings and between the trench walls shall be done in accordance with the engineers' specifications.

7.2 **Tamping.** This shall be done by hand tamping of the embedment material between the trench wall of the service line fitting and riser connection. Tamping can also be done by mechanical tampers or by using water to consolidate the embedment material. **Extreme unstable ground conditions** may require wider trenches to enable you to compact a larger area around the pipe and fittings to the density consistent of the original ground surface conditions.

8.0 **Service Lines.** Normally, service lines from the property line to the collection sewer should be a minimum depth of 3 feet at the property line and should be laid in straight alignment and uniform slope of not less than 1/4" per foot for 4" nominal pipe and 1/8" per foot for 6" pipe. Where collection sewers are deeper than 7 feet a vertical standpipe of stack is permitted but not recommended, consult the project engineer for proper installation details. Deep sewer chimney and risers necessitate extreme care during backfilling. Where surface loading is anticipated the final backfill must be compacted to a density compatible with those surface loads to be encountered.

8.1 **Backfilling around pipe service laterals on slope.** Extra attention should be given on slopes to prevent the newly backfilled trench from becoming a "French Drain." Before backfilling completely there is a tendency for ground and surface water to follow the direction of the looser soil. This flow may wash out soil from under or around pipe and branch line fittings, reducing or eliminating the support needed. To avoid this problem the backfilling should be of greater compaction. Tamping should be done in 4" layers and continued in this manner all the way up to ground or surface line of the trench. Concrete collars or other concrete poured around the fitting to stabilize unwanted movement is recommended to prevent water from undercutting the underside of the pipe and fittings.

SUMMARY: Due to various ground conditions and different situations, installation techniques vary widely. We warranty our products to be free of manufacturer's defects. We will not replace the products that are installed or used incorrectly. The design of the systems that our product is used in is a factor that cannot be overlooked.

GPK FITTING SUBMITTAL SHEET

Intro: GPK manufactures PVC HWS Fittings in accordance with ASTM D-3034 and F-1336 and F-679 to be used in gravity flow or low pressure applications. Fabricated fittings are produced in sizes 4" through 36" diameter. Injection molded fittings produced in sizes 4" through 8" diameter.

Material: Fabricated fittings are manufactured from PVC pipe and meeting all the requirements of ASTM D-3034, SDR 26 and F-679 PS115 for workmanship, extrusion quality, stiffness, impact resistance, dimensions and structural performance.

Extruded pipe components are made from PVC material with a minimum cell classification of 12454, 13343 or 12364 as defined in ASTM D-1784.

Injection molded fittings are made from PVC material with a minimum cell classification of 12454 or 13343 as defined in ASTM D1784.

Extrusion Quality: Extruded components are tested in accordance with and meet all requirements of ASTM D-2152 for properly fused PVC.

Impact Resistance: Extruded components are tested in accordance with ASTM D-2444 using a 20 lb. Tup A and a Flat Plate Holder B. The strength shall equal or exceed the values shown below:

4" - 5"	150 Ft-Lbf
6" - 8"	210 Ft-Lbf
10" - 36"	220 Ft-Lbf

Impact Resistance: Injection molded fittings are tested in accordance with ASTM D 2444 using a 20 lb. Tup A and a Flat Plate Holder B. The strength shall equal or exceed the values shown below:

4"	50 Ft-Lbf	6"	75 Ft-Lbf	8"	75 Ft-Lbf

Pipe Stiffness: Extruded components are tested in accordance with ASTM D-2412. The stiffness equals or exceeds the requirements of ASTM D-3034 and F-679.

Pipe Flattening: Extruded components are flattened as described in ASTM D-3034 and F-679 until the distance between the plates is 40% of the outside diameter of the pipe. There shall be no splitting, cracking or breaking.

Pressure/Pressure Deflection: Gasketed joints are tested in accordance with ASTM D-3212.
Pressure: 10 minutes @ 10.8 psi + 10 minutes deflected @ 10.8 psi.
Vacuum: 10 minutes @ 22" Hg + 10 minutes deflected @ 22" Hg.

Branch Bending: The chemically fused areas around thefabricated branches of tee, wye and tee-wye fittings are tested to ASTM F-1336 to verify their strength and integrity.

Pipe Stop Support: Tee and tee-wye fittings are tested to requirements of ASTM F1336 for pipe stop load support. No cracking or splitting shall occur and pipe spigot shall not protrude into waterway of the fitting.

Joining Methods: Chemically Fused Solvent Weld Joints
Solvent cement is handled and tested in accordance with ASTM D-2564 and D-2855. The Lap Shear Strength shall equal or exceed 900 psi @ 72 hours.

Heat Fusion Welded Joints (Butt Fusion Welds)

Elastomeric Seals (Gaskets)
Must meet all requirements of ASTM F-477 and D-3212.

Epoxy Reinforced Welds.

INDURON
PROTECTIVE COATINGS
Look Beneath the Surface.

PROTECTO 401™ Ceramic Epoxy

STANDARD SPECIFICATION FOR LINING DUCTILE IRON PIPE FOR SEWER SERVICE

I. CONDITION OF DUCTILE IRON PRIOR TO SURFACE PREPARATION

All ductile pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the ductile iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six inches of the exterior of the spigot ends.

II. LINING MATERIAL

The standard of quality is Protecto 401™ Ceramic Epoxy. The material shall be an amine cured novolac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.

A. A permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.

B. The following test must be run on coupons from factory lined ductile iron pipe:

* ASTM B-117 Salt Spray (scribed panel) - Results to equal 0.0 undercutting after two years.
* ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F. Results to equal no more than 0.5 mm undercutting after 30 days.
* Immersion testing rated using ASTM D-714-87.
  —20% Sulfuric acid—No effect after two years.
  —140°F 25% Sodium Hydroxide—No effect after two years.
  —160°F Distilled Water—No effect after two years.
  —120°F Tap Water (scribed panel)—0.0 undercutting after two years with no effect.
* ASTM G-22 90 Standard practice for determining resistance of Synthetic Polymeric materials to bacteria. The test should determine the resistance to growth of Acidithiobacillus Bacteria and should be conducted at 30 degrees centigrade for a period of 7 days on a minimum of 4 panels. The growth must be limited only to trace amounts of bacteria.

C. An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598: 1994 Section 7.8 Abrasion Resistance.

III. APPLICATION

Applicator

The lining shall be applied by a certified firm with a successful history of applying linings to the interior of ductile iron pipe and fittings. All applicators must be independently inspected at least two times per year to insure compliance with the requirements of this specification. This inspection must be coordinated and reviewed by the manufacturer of the lining material and any deviation from the application and/or quality requirements shall be corrected by the applicator. All inspections shall be in writing and a permanent record maintained.

induron.com | Fax (205) 324-6942 | Telephone (205) 324-9584 | Birmingham, AL 35201 | P.O. Box 2371

Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas with oil, grease, or any substance that can be removed by solvent, shall be solvent cleaned to remove those substances. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering oxide may be left on the surface. Any area where rust reappears before lining must be re-blasted.

Lining

After surface preparation and within 12 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, the gasket area and spigot end up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum using Protecto 401™ Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. To prevent delamination between coats, no material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.

Touch-Up and Repair

Protecto 401™ Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.

IV. INSPECTION AND CERTIFICATION

Inspection

All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC PA-2 Film Thickness Rating.

The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired prior to shipment.

Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

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Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

V. HANDLING

Lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.

Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

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AA Thread Seal Tape, Inc.
1275 KYLE COURT
WAUCONDA, IL 60084
Tel: (800) 537-7139 • Fax: (847) 526-2209
E-Mail: support@aathread.aranya.com
Website: aathread.com

Product Specifications

Model 76002, Model # 76002 12 MIL Clear Polyethylene Encasements for Ductile Iron Pipe

SPECIFICATIONS

Item #	76002
Item Name	12 MIL Clear Polywrap
Pipe Diameter	up to 8"
Tube Size	20" x 220'
Width	20
Length	220
Pipe Length	20
Perforations	22
Thickness	12
Country of Origin	USA
Tensile Strength	MD-4594 psi, TD-4410 psi
Elongation	MD-1073%, TD-1126%
Dielectric Strength	1946 V/MIL
Impact Resistance	1189
Propagation Tear Resistance	MD-4462 g/f, TD-5539 g/f
Standard	ANSI/AWWA C105/A21.5
Markings	Pipe Diameter, Corrosion Warning, MIL thickness, Spec, Date of manufacture.
Quantity/Case	1 roll
Lbs./Roll	47
Length<!--1-->	21 1/2
Width<!--1-->	10
Height	10
Units Per Package	1
Note	This material is clear plastic and has "Waterline" printed on it.

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Website: aathread.com

Product Specifications

Model 76002, Model # 76002 12 MIL Clear Polyethylene Encasements for Ductile Iron Pipe

SPECIFICATIONS

Package Type	Each
Description	CLEAR POLYWRAP .012 X 20" X 220' /22'PERF

Ductile Iron MJ Compact Fittings

ANSI/AWWA C153/A21.53

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Fusion Bonded - see pgs. below

GENERAL SPECIFICATIONS

MATERIAL:	Ductile Iron per ASTM A536, Grade 65-45-12
PRESSURE:	350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes and 150 PSI rating for 54" - 64" sizes
TESTING:	In accordance with ANSI/AWWA C153/A21.53 and UL requirements
LAYING LENGTH:	In accordance with ANSI/AWWA C153/A21.53 (fittings not listed in ANSI/AWWA have dimensions per Star design as noted in the catalog)
DEFLECTION:	2"- 4"=8° | 6"=7° | 8"-12"=5° | 14"-16"=3 ½° | 18"-24"=3° | 30"-48"=2°
WEIGHTS:	Are in pounds, unless noted otherwise and do not include accessories, cement lining and coating
FLANGES:	Flanged ends on fittings match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges
CEMENT LINING:	In accordance with ANSI/AWWA C104/A21.4 -- size 2" - 3" single thickness and sizes 4" - 64" double thickness
COATING:	Asphaltic seal coat inside and out in accordance with ANSI/AWWA C104/A21.4 and referenced in ANSI/AWWA C153/A21.53
GASKETS:	SBR in accordance with ANSI/AWWA C111/A21.11
T-BOLTS/NUTS:	Low alloy steel in accordance with ANSI/AWWA C111/A21.11
APPROVALS:	3" - 12" UL/ULC Listed | 3" and greater are UL/NSF-61 | 3" - 16" FM APPROVED. Please consult factory for detail listing and approvals.
DIMENSIONS:	All dimensions are in inches unless noted otherwise.

AWWA MEMBER

ULC

UL

CLASSIFIED UL WATER QUALITY

FM APPROVED

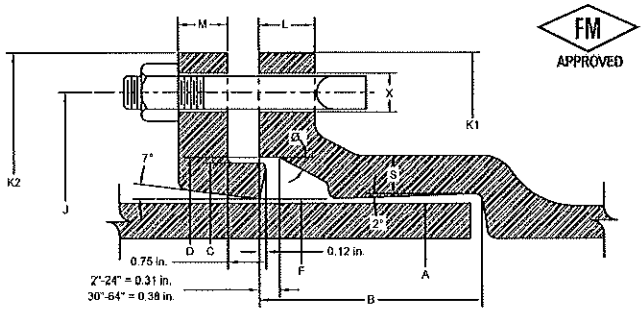
SUBMITTAL INFORMATION

PROJECT NAME:

ENGINEER:

CONTRACTOR:

SPEC. SECTION:



MECHANICAL JOINT DIMENSIONS

NOM. SIZE	A DIA.	B	C DIA.	D DIA.	F DIA.	J DIA.	K1 DIA.	K2 DIA.	L	M	S	Ø	X DIA.	BOLTS SIZE	BOLTS NO.
2	2.50	2.50	3.39	3.50	2.61	4.75	6.19	6.25	0.58	0.62	0.36	28°	¾	⅝ x 3	2
3	3.96	2.50	4.84	4.94	4.06	6.19	7.62	7.69	0.58	0.62	0.39	28°	¾	⅝ x 3	4
4	4.80	2.50	5.92	6.02	4.90	7.50	9.06	9.12	0.60	0.75	0.39	28°	⅞	¾ x 3 ½	4
6	6.90	2.50	8.02	8.12	7.00	9.50	11.06	11.12	0.63	0.88	0.43	28°	⅞	¾ x 3 ½	6
8	9.05	2.50	10.17	10.27	9.15	11.75	13.31	13.37	0.66	1.00	0.45	28°	⅞	¾ x 3 ½	6
10	11.10	2.50	12.22	12.34	11.20	14.00	15.62	15.62	0.70	1.00	0.47	28°	⅞	¾ x 3 ½	8
12	13.20	2.50	14.32	14.44	13.30	16.25	17.88	17.88	0.73	1.00	0.49	28°	⅞	¾ x 3 ½	8
14	15.30	3.50	16.40	16.54	15.44	18.75	20.25	20.25	0.79	1.25	0.55	28°	⅞	¾ x 4	10
16	17.40	3.50	18.50	18.64	17.54	21.00	22.50	22.50	0.85	1.31	0.58	28°	⅞	¾ x 4	12
18	19.50	3.50	20.60	20.74	19.64	23.25	24.83	24.75	1.00	1.38	0.68	28°	⅞	¾ x 4	12
20	21.60	3.50	22.70	22.84	21.74	25.50	27.08	27.00	1.02	1.44	0.69	28°	⅞	¾ x 4	14
24	25.80	3.50	26.90	27.04	25.94	30.00	31.58	31.50	1.02	1.56	0.75	28°	⅞	¾ x 4 ½	16
30	32.00	4.00	33.29	33.46	32.17	36.88	39.12	39.12	1.31	2.00	0.82	20°	1 ⅛	1 x 5 ½	20
36	38.30	4.00	39.59	39.76	38.47	43.75	46.00	46.00	1.45	2.00	1.00	20°	1 ⅛	1 x 5 ½	24
42	44.50	4.00	45.79	45.96	44.67	50.62	53.12	53.12	1.45	2.00	1.25	20°	1 ⅜	1 ¼ x 6	28
48	50.80	4.00	52.09	52.26	50.97	57.50	60.00	60.00	1.45	2.00	1.35	20°	1 ⅜	1 ¼ x 6	32

SIZE RANGE (Please specify):

Size Range _____

LINING OPTIONS (Please check one):

- [ ] Standard: Cement-lined and asphalt seal coat per ANSI/AWWA C104/A21.4 and UL/NSF-61
- [x] Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61
- [ ] Optional: P401 (Protecto 401) Ceramic Epoxy - sewer applications only. Not NSF-61
- [ ] Optional: Other (specify) _____

COATING OPTIONS (Please check one):

- [x] Standard: Asphaltic seal coat per ANSI/AWWA C104/A21.4
- [x] Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61
- [ ] Optional: Other (specify) _____

STAR PIPE PRODUCTS
HOUSTON CORPORATE TOLL FREE 1-800-999-3009 FAX 281-558-9000
www.starpipeproducts.com

Shear Adhesion ASTM D1002-94:		Adhesion CSA Z245.20-02:		Rating
Average	6555 psi	75°C, 24 hr.	1 - 2	Pass
Minimum	5934 psi			
Maximum	7865 psi			

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Thermal Conductivity: 0.19 ± 0.02 BTU/hr./ft²/ft./°F
ASTM C177

Cathodic Disbondment:
CSA Z245.20-02

24 hr., 3.5 volts, 65°C (150°F)	2 - 4 mm radius	Pass
28 days, 1.5 volts, 25°C (77°F)	3 - 5 mm radius	Pass
Strained C.D.	No Cracking	Pass

TYPICAL ELECTRICAL PROPERTIES

Dielectric Strength: ASTM D149-97	1500 volts/mil @ 250µm (10 mils)	**Breakdown voltage:** ASTM D149-97	20000 volts @ 450µm (18 mils) 17000 volts @ 250µm (10 mils)
Dielectric Constant: ASTM D150	2.15 at 1 MHz	**Volume Resistivity:** ASTM D257	3.3×10^{15} ohm-cm.

CHEMICAL RESISTANCE TESTS *

90-Day Immersion per CSA Z245.20-02

HCl in H_2O**, 10% NaCl, H_2SO_4 in H2O**, 10% NaCl in H_2O, Distilled Water, 5% NaOH in H2O**, $MgCO_3/CaCO_3$ in H2O** No Blistering

* For additional information refer to Nap-Gard Products Catalog Chemical Resistance Chart.
**Distilled Water

GENERAL APPLICATION PARAMETERS

1. Grit blast to NACE Near-White specifications (Swedish Standard #Sa 2½) and profile between 50µm (2 mils) and 112µm (4.5 mils).
2. Use phosphoric acid/deionized water rinse if water soluble salt contamination is suspected.
3. Preheat pipe to approximately 240°C (464°F).
4. Apply Nap-Gard® 7-2500 powder to meet customer thickness specifications.
5. Follow recommended cure schedule (see below).
6. Electrically inspect for holidays and repair all found with Nap-Gard® 7-1631S, 7-1847, or 7-1861.

Revised 10/18/2005

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NAP-GARD®
FBE Powder Coatings

Technical Information Sheet

NSF®

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PRODUCT NUMBER: 7-2500
APPLICATION: Large Diameter Pipe

Introduction:

Nap-Gard® Product No. 7-2500 is a thermosetting epoxy powder designed as a coating for underground and subsea pipeline service. In buried service, the coating is capable of withstanding continuous operating temperatures of 107°C (225°F). This product has been certified to meet the requirements of CSA Z245.20-02, NACE RP-0394 and NSF 61 for Potable Water Services. This product is also recommended for valves and fittings at an average film thickness of 8 mils per the NSF requirement and for use as a primer on multi-layer systems at recommended 8 – 12 mils.

POWDER PROPERTIES

Color:	Reddish Brown	**Theoretical Coverage:**	134 Ft^2/lb/mil
Specific Gravity:	1.44 ± .03	**Typical Gel Time:** @ 205°C (401°F) CSA	22 ± 4 Sec.
Density: CSA Z245.20-02 (Section 12.6.2.3)	1440 ± 50 g/L	**Shelf Life @ 25°C (77°F):** @50% RH	12 months
Thermal Characteristics: CSA Z245.20-02	Tg_1 = 58 ± 5°C Tg_2 = 106 ± 6°C Δ H = 68 ± 10 (J/g)		

TYPICAL PROPERTIES OF APPLIED FILM

Recommended Film Thickness:	350µm (14 mils) Average 300µm (12 mils) Minimum	**DSC – glass transition temperature** Tg_3 = 110°C (230°F) CSA Z245.20-02	
Impact Resistance: ASTM G14-72 1/8" X 5" X 8" Steel Panels CSA Z245.20-02	@ 25°C (77°F) 160 in.lbs. @-30°C (-22°F) › 1.5 J Pass	**Hardness:** Barcol, ASTM D2583 Shore D, ASTM D2240-74	61 avg. 90 avg.
Elongation: Modified ASTM D2370-98	@23°C (73°F) 10.96%	**Compressive Strength:** ASTM D695-95	12257 psi (+/- 15%)
Bending: CSA-Z245.20-02 API-RP-5L7	@-30°C (-22°F) 3.0°/pipe dia. Passes all requirements	Pass	
Tensile Strength: ASTM D2370-98/D882-91	9436 psi		

Performance depends on film thickness. Consult Nap-Gard® Specialist for specific recommendations.

Revised 10/18/2005

DuPont Powder Coatings, U.S.A.
9800 Genard Rd.
Houston, TX 77041
Tel.: 713-939-4000
Fax: 713-939-4027
www.dupontpowder.com

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GEL TIME & CURE SCHEDULE GUIDELINES

The cure schedule for Nap-Gard® Product No. 7-2500 shows the minimum time at temperature required to achieve the typical performance properties of the coating. Because pipe cooling rates vary so widely with pipe wall thickness, no allowance has been made for heat loss from the pipe but this can be easily measured on the coating line and allowance made.
Recommended powder application temperature range is 226°C (438°F) to 253°C (488°F) and post heating is not a normal requirement. The minimum post application curing temperature (as measured on the coated pipe), and the time to quench may conform to the following cure schedule:

Gel Time (CSA Method)

Temperature	Time (Seconds)	Cure Schedule	Time to Quench**
205°C (401°F)	20	226°C (438°F)	120 Seconds
220°C (428°F)	12	232°C (450°F)	80 Seconds
226°C (438°F)	10	239°C (462°F)	60 Seconds
232°C (450°F)	9		

CAUTION Recommended time to quench is based on the assumption that the listed temperature is maintained without any cool down rate. Time to quench will vary with application parameters and pipe sizes. ***Therefore, the above information shall be used only as a guideline by the applicator to develop proper time to quench. Cure should be verified by DSC or other methods. For multi-layer, the optimum time for adhesive application is between 30-70% cure of the FBE. This has to be developed by the applicator based on his plant layout.***

Revised 10/18/2005

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PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint
for AWWA C900/C905 and IPS PVC Pipe

6" PVC Stargrip® Series 4000 for PVC Pipe

SUBMITTAL INFORMATION

PROJECT NAME:

ENGINEER:

CONTRACTOR:

SPEC. SECTION:

FEATURES & ADVANTAGES

- The design eliminates tie rods and thrust blocks and has been proven in the market since 1992.
- Can be used on 4"-12" AWWA C900, 14"-36" AWWA C905 PVC pipe or 3"-12" IPS PVC pipe* ***(*transition gasket required on IPS PVC Pipe 12" and under)***.
- Listed with Underwriters Laboratories in sizes 4"-12" for use on DR18 class 235 C900 PVC pipe at 150 PSI. Approved by Factory Mutual Research in sizes 4"-12" for use on DR18 class 235 at 150 PSI and for sizes 4"-10" DR14 class 305 C900 PVC pipe at 200 PSI.
- Tested to and meets the requirements of ASTM F1674 through 14" size for DR18 PVC pipe.
- The safety factor is twice (2:1) the standardized pressure rating listed on Page 18 of the catalog.
- Will fit any Mechanical Joint configuration, meaning compatibility with different types of installations.
- PVC Stargrip® offers 5° deflection through 12", 3° on 14"-24" and 2° on 30"-36".
- Larger ID allows easier installation on out-of-round pipe.
- All sizes have curved wedges that will not flatten pipe.
- For use on HDPE or C909 pipe, please contact Star Engineering.

MATERIAL SPECIFICATIONS:

- Gland: Ductile Iron per ASTM A536, Grade 65-45-12
- Wedges: Ductile Iron per ASTM A536, Grade 65-45-12 heat treated to a minimum of 370 BHN
  - Wedge Finish: Thermally cured fluoropolymer epoxy coating

GLAND FINISH OPTIONS (Please check one):

- ☐ Standard: alkyd enamel coating
- ☑ Optional: Starbond™ TGIC polyester powder coating applied by an electrostatic spray process
- ☐ Optional: Other (specify) _____

COUNTRY OF ORIGIN OPTION (Please check one):

- ☑ Import
- ☐ 100% Domestic[1]
- ☐ Domestic gland with import components[1]

([1]Please see Domestic Restraint Options Available on our website.)

HARDWARE OPTIONS (Please check):

- ☑ Standard: T-bolts are high strength low alloy steel manufactured in accordance with ANSI/AWWA C111/A21.11-00
- ☐ Optional: T-bolts and nuts alloy SS 304 per ASTM F593
- ☐ Optional: T-bolts and nuts alloy SS 316 per ASTM F593
- ☐ Optional: T-bolts and nuts Fluoropolymer Star-Blue coated high strength low alloy steel manufactured in accordance with ANSI/AWWA C111/A21.11-00

STAR® PIPE PRODUCTS

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www.starpipeproducts.com

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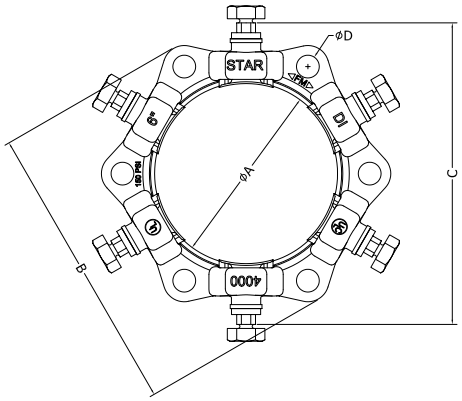
Mechanical Joint Wedge Action Restraint
for AWWA C900/C905 and IPS PVC Pipe

TECHNICAL INFORMATION



6" PVC Stargrip® Series 4000 for PVC Pipe

PVC STARGRIP® 4000 SPECIFICATIONS*

Please check sizes:	NOM. SIZE	C900/C905 PIPE CI OD	IPS PIPE OD (TRANSITION GASKET REQUIRED)	ØA	B	C[1]	ØD	T-BOLTS SIZE (QTY)	WEDGES (QTY)	APPROX WT. (LBS)
☐	3	N/A	3.50	4.09	7.69	8.50	3/4	5/8 (4)	4	7
☐	4	4.80	4.50	4.93	9.12	9.53	7/8	3/4 (4)	4	9
☐	6	6.90	6.63	7.03	11.12	11.63	7/8	3/4 (6)	6	13
☐	8	9.05	8.63	9.18	13.37	13.97	7/8	3/4 (6)	6	17
☐	10	11.10	10.75	11.23	15.62	16.18	7/8	3/4 (8)	8	23
☐	12	13.20	12.75	13.33	17.87	18.18	7/8	3/4 (8)	8	28
☐	14	15.30	N/A	15.45	20.75	20.36	7/8	3/4 (10)	10	50
☐	16	17.40	N/A	17.55	23.00	22.46	7/8	3/4 (12)	12	60
☐	18	19.50	N/A	19.65	25.25	24.56	7/8	3/4 (12)	12	65
☐	20	21.60	N/A	21.75	27.50	26.66	7/8	3/4 (14)	14	76
☐	24	25.80	N/A	25.95	32.00	30.86	7/8	3/4 (16)	16	98
☐	30	32.00	N/A	32.18	39.38	36.82	1-1/8	1 (20)	20	173
☐	36	38.30	N/A	38.48	46.25	43.12	1-1/8	1 (24)	24	219

**All dimensions in inches except where indicated.*

1 - dimension after assembly on pipe

MAXIMUM WORKING PRESSURE RATING WITH OCCASSIONAL & RECURRING SURGES

NOM. SIZE (IN)	C900			C905				ASTM D2241		
	DR14	DR18	DR25	DR18	DR21	DR25	DR32.5	SDR17	SDR21	SDR26
3								250	200	160
4	305	235	165					250	200	160
6	305	235	165					250	200	160
8	305	235	165					250	200	160
10	305	235	165					250	200	160
12	305	235	165					250	200	160
14				235	200	165	125			
16				235	200	165	125			
18				200	200	165	125			
20				200	200	165	125			
24				165	165	165	125			
30						165	125			
36						165	125			

REV.13-1

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